THATCHER WATER COMPANY (PWS 6210018)
SOURCE WATER ASSESSMENT FINAL REPORT

January 10, 2003

State of Idaho
Department of Environmental Quality

Executive Summary

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency (EPA) to assess every source of public drinking water for its relative sensitivity to contaminants regulated by the Act. This assessment is based on a land use inventory of the designated assessment areas and sensitivity factors associated with the spring, and the aquifer characteristics.

This report, *Source Water Assessment for Thatcher Water Company, Idaho*, describes the public water system (PWS), the boundaries of the zones of water contribution, and the associated potential contaminant sources located within these boundaries. This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. **The results should <u>not be</u> used as an absolute measure of risk and they should <u>not be</u> used to undermine public confidence in the water system.**

The Thatcher Water Company (PWS #6210018) near Highway 34 in Franklin County, is a community drinking water system consisting of one spring, which was developed in 1973. The spring is the system's primary source of water, supplying approximately 5,000 gallons per day and maintaining a 9,000-gallon storage reservoir. The water system serves approximately 25 persons through 13 connections.

No potential contaminant point sources exist within the delineation's capture zone.

Final spring susceptibility scores are derived from heavily weighting potential contaminant/land use scores and summing them with system construction scores. Therefore, a low rating in one category coupled with a higher rating in the other category results in a final rating of low, moderate, or high susceptibility. With the potential contaminants associated with most urban and heavily agricultural areas, the best score a spring can get is moderate. Potential contaminants are divided into four categories, inorganic chemical (IOCs, i.e., nitrates, arsenic) contaminants, volatile organic chemical (VOCs, i.e., petroleum products) contaminants, synthetic organic chemical (SOCs, i.e., pesticides) contaminants, and microbial contaminants (i.e. bacteria). As different drinking water sources, whether they are wells or springs, can be subject to various contamination settings, separate scores are given for each type of contaminant.

For the assessment, a review of laboratory tests was conducted using State Drinking Water Information System (SDWIS). No SOCs have been detected in the spring. The VOCs bromodichloromethane, chlorodibromomethane, and chloroform, disinfection byproducts related to chlorine, were detected in water originating from the spring in June and September 1996. The IOCs arsenic, barium, selenium, fluoride, and nitrate have been detected in tested water, but at levels below the maximum contaminant level (MCL) as established by the EPA. Radionuclides (RADs), gross alpha and gross beta, were also detected and were below the designated MCL. The spring exists in a nitrate priority area, and nitrate has been detected in concentrations as high as 8.31 milligrams per liter (mg/L), which is approaching the MCL of 10 mg/L. Repeat detections of total coliform have occurred in the distribution system between February 1993 and June 2000. In addition, *E. coli* bacteria have also been detected in the distribution system in June 1994 and June 2000. Total coliform has been detected once at the spring in May 1997.

The arsenic concentration detected in the spring in 1997 was 0.005 mg/L. In October 2001, the EPA lowered the arsenic MCL to 0.01 mg/L from 0.05 mg/L, giving systems until 2006 to comply with the new standard.

In terms of total susceptibility, the spring rated moderate for IOCs, VOCs, SOCs, and automatically rated high for microbial contaminants due to bacteria found at the spring in May 1997 indicating a pathway for contamination already exists. System construction rated moderate, and potential contaminant and land use scores were moderate for IOCs, and low for VOCs, SOCs, and microbial contaminants.

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources. If the system should need to expand in the future, new well or spring sites should be located in areas with as few potential sources of contamination as possible, and the site should be reserved and protected for this specific use.

For the Thatcher Water Company, drinking water protection activities should first focus on correcting any deficiencies outlined in the sanitary survey (an inspection conducted every five years with the purpose of determining the physical condition of a water system's components and its capacity). As land uses within most of the source water assessment areas are outside the direct jurisdiction of the Thatcher Water Company, collaboration and partnerships with state and local agencies and industry groups should be established and are critical to success.

Should microbial contamination continue to be a problem, appropriate disinfection practices would need to be maintained in a way to protect the drinking water from VOC by-products, a result of the chlorinating disinfection. The disinfection products detected in the water were bromodichloromethane, chlorodibromomethane, and chloroform. Though water cannot be totally free of by-products when disinfection is used, they can be reduced by treatment modifications. More information can be researched on the EPA website (www.epa.gov/safewater/).

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the EPA. Drinking water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture, the Soil Conservation Commission, and the Franklin County Soil Conservation District.

A community must incorporate a variety of strategies in order to develop a comprehensive drinking water protection plan, be they regulatory in nature (i.e., zoning, permitting) or non-regulatory in nature (i.e., good housekeeping, public education, specific best management practices). For assistance in developing protection strategies please contact the Pocatello Regional Office of the Idaho Department of Environmental Quality or the Idaho Rural Water Association.

SOURCE WATER ASSESSMENT FOR
THATCHER WATER COMPANY, THATCHER, IDAHO

Section 1. Introduction - Basis for Assessment

The following sections contain information necessary to understand how and why this assessment was conducted. **It is important to review this information to understand what the ranking of this assessment means.** Maps showing the delineated source water assessment area and the inventory of significant potential sources of contamination identified within that area are included. The list of significant potential contaminant source categories and their rankings used to develop the assessment also is included.

Level of Accuracy and Purpose of the Assessment

The Idaho Department of Environmental Quality (DEQ) is required by the U.S. Environmental Protection Agency (EPA) to assess over 2,900 public drinking water sources in Idaho for their relative susceptibility to contaminants regulated by the Safe Drinking Water Act. This assessment is based on a land use inventory of the delineated assessment area, sensitivity factors associated with the spring, and aquifer characteristics. All assessments must be completed by May of 2003. The resources and time available to accomplish assessments are limited. Therefore, an in-depth, site-specific investigation to identify each significant potential source of contamination for every public water system (PWS) is not possible. **This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. The results should <u>not be</u> used as an absolute measure of risk and they should <u>not be</u> used to undermine public confidence in the water system.**

The ultimate goal of the assessment is to provide data to local communities to develop a protection strategy for their drinking water supply system. DEQ recognizes that pollution prevention activities generally require less time and money to implement than treatment of a public water supply system once it has been contaminated. DEQ encourages communities to balance resource protection with economic growth and development. The information necessary to develop a drinking water protection program should be determined by the local community, and be based upon its own needs and limitations. Wellhead or drinking water protection is one facet of a comprehensive growth plan, and it can complement ongoing local planning efforts.

Section 2. Conducting the Assessment

General Description of the Source Water Quality

The Thatcher Water Company (PWS #6210018), near Highway 34 in Franklin County (Figure 1), is a community drinking water system consisting of one spring which was developed in 1973. The spring is the system's primary source of water, supplying approximately 5,000 gallons per day and maintaining a 9,000-gallon storage reservoir. The water system serves approximately 25 persons through 13 connections. No synthetic organic chemicals (SOCs) have been detected in the spring. The volatile organic chemicals (VOCs) bromodichloromethane, chlorodibromomethane, and chloroform, disinfection byproducts related to chlorine, were detected in water originating from the spring in June and September 1996. The inorganic chemicals (IOCs) arsenic, barium, selenium, fluoride, and nitrate have been detected in tested water, but at levels below the maximum contaminant level (MCL) set by the EPA. Radionuclides (RADs), gross alpha and gross beta, were also detected and were below the designated MCL. The spring exists in a nitrate priority area, and nitrate has been detected in concentrations as high as 8.31 milligrams per liter (mg/L), which is approaching the MCL of 10 mg/L. Repeat detections of total coliform have occurred in the distribution system between February 1993 and June 2000. In addition, *E. coli* bacteria have also been detected in the distribution system in June 1994 and June 2000. Total coliform has been detected once at the spring in May 1997.

The arsenic concentration detected in the spring in 1997 was 0.005 mg/L. In October 2001, the EPA lowered the arsenic MCL to 0.01 mg/L from 0.05 mg/L, giving systems until 2006 to comply with the new standard.

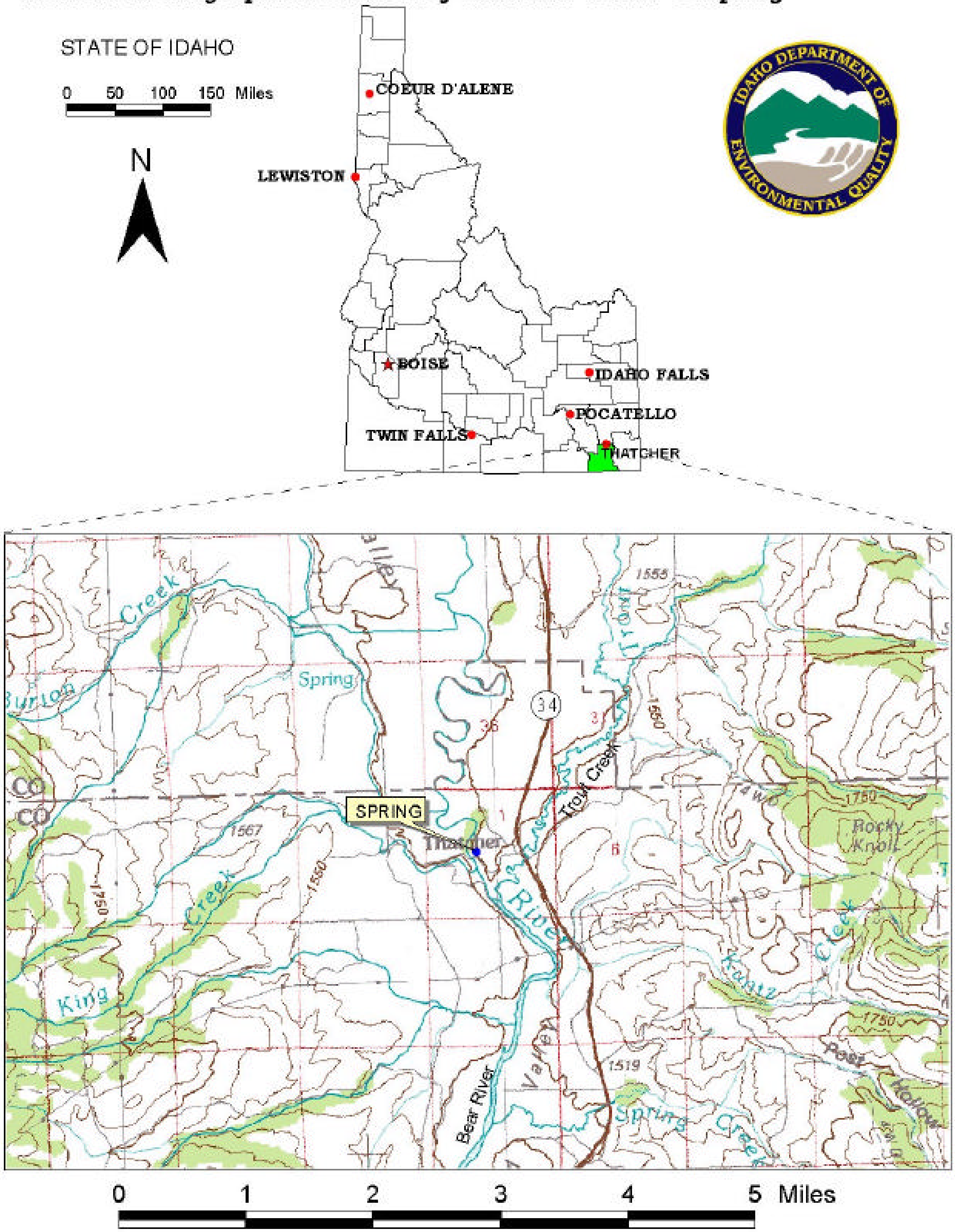
Defining the Zones of Contribution – Delineation

The delineation process establishes the physical area around a well or spring that will become the focal point of the assessment. The process includes mapping the boundaries of the zone of contribution into time-of-travel (TOT) zones (zones indicating the number of years necessary for a particle of water to reach a pumping well or flowing spring) for water in the aquifer. Washington Group International (WGI) was contracted by DEQ to define the public water system's zones of contribution. WGI used a conceptual computer model approved by the EPA in determining the 3-year (Zone 1B), 6-year (Zone 2), and 10-year (Zone 3) TOT for water associated with the Gem Valley hydrologic province in the vicinity of the Thatcher Water Company. The computer model used site specific data, assimilated by WGI from a variety of sources including operator records, and hydrogeologic reports. A summary of the hydrogeologic information from the WGI is provided below.

Hydrogeologic Conceptual Model

Graham and Campbell (1981) identified and described 70 regional ground water systems throughout Idaho. Thirty-four of these fall within the southeastern part of the state. The "None" hydrologic province, as defined in this report, includes all the area outside of the 34 regional systems in southeast Idaho. The smaller and more localized aquifers in the "None" province typically are situated in the foothills and mountains that surround and recharge the regional ground water systems.

FIGURE 1. Geographic Location of Thatcher Water Company



The mountains and valleys within the "None" hydrologic province were formed during two events separated by approximately 50 to 70 million years (Alt and Hyndman, 1989, pp. 329 and 336). The overthrust belt of the northern Rocky Mountains was formed roughly 70 to 90 million years ago through the intrusion of granitic magma and a massive eastward movement of large slabs of layered sedimentary rocks along faults that dip shallowly westward (Alt and Hyndman, 1989, p. 329). This movement caused extreme folding and fracturing of the sedimentary and granitic rocks and, in many cases, left older formations lying on top of younger ones. Later Basin and Range block faulting broke up the largely eroded Rocky Mountains into large uplifted and downthrown blocks resulting in the present day northwest trending mountains and valleys seen throughout southeast Idaho. Paleozoic and Precambrian limestone, dolomite, sandstone, shale, siltstone, and quartzite are the predominant materials forming the mountains and probably compose the bedrock underlying the valleys between Salmon, Idaho on the north side of the Snake River Plain and Franklin, Idaho near the Utah/Idaho border (Dion, 1969, p.18; Kariya et al., 1994, p. 6; Bjorklund and McGreevy, 1971, p. 12; and Parliman, 1982, p. 9).

Ground water movement in the mountains is primarily through a system of solution channels, fractures and joints that commonly transmit water independently of surface topography (Bjorklund and McGreevy, 1971, p. 15; Dion, 1969, p. 18). Ralston and others (1979, pp. 128-129) state that the geologic structural features also can contribute to the development of cross-basin ground water flow systems. Ground water entering a geologic formation tends to follow the formation because hydraulic conductivities are greater parallel to the bedding planes than across them. Synclines and anticlines provide structural avenues for ground water flow under ridges from one valley to another.

The average annual precipitation in the mountains of southeast Idaho ranges from 20 inches on ridges near Soda Springs to over 45 inches on the Bear River Range (Ralston and Trihey, 1975, p. 7, and Dion, 1969, p. 11). The valleys receive an average of 7 to 10 inches annually (Donato, 1998, p. 3, and Dion, 1969, p. 11). Precipitation and seepage from streams are the primary source of recharge to the mountain aquifers (Kariya, et al., 1994, p. 18, and Parliman, 1982, p. 13).

Ground water discharge occurs as springs and seeps issuing from faults, fractures, and solution channels and as underflow to regional aquifers. The Bear River Basin in the far southeast corner of the state contains hundreds of springs issuing primarily from fractures and solution openings in the bedrock mountains (Dion, 1969, p. 47, and Bjorklund and McGreevy, 1971, pp. 34-35). Within Cache Valley, many springs discharge from the valley-fill deposits (Kariya et al., 1994, p. 32).

There is little available information on the distribution of hydraulic head and the hydraulic properties of the aquifers in the "None" hydrologic province. No U.S.Geological Survey (2001) or Idaho Statewide Monitoring Network (Neely, 2001) wells are located in the areas of concern to provide information on ground water flow direction and hydraulic gradient or to aid in model calibration. The information that is available indicates that the hydraulic properties are quite variable, even within a specific rock type. Ralston and others (1979, p. 31), for example, present hydraulic conductivity estimates for fractured chert ranging from 2.2 to 75 feet/day. Estimates for phosphatic shale are as low as 0.07 feet/day (unfractured) and as high as 25 feet/day (fractured).

Hydrologic Province

The Gem Valley – Gentile Valley hydrologic province occupies approximately 144 square miles west of the Soda Springs hydrologic province. The Basin and Range physiographic province is north to south trending and is bounded on the east by the Bear River Range and on the west by the Portneuf Range. Average annual precipitation on the valley floor is assumed to be of similar magnitude to the values for Soda Springs and Cache Valley because of proximity and intermediate elevation.

The Gem and Gentile Valley floors consist of Quaternary gravels, sands, silts, and clays, and Quaternary and Tertiary olivine basalt flows. The sediments are more prevalent in the Gentile Valley and are the primary water-producing units. The basalt flows found primarily in Gem Valley overlie and interfinger sediment deposits (Dion, 1969, p. 16). The basalts are the principal aquifer in Gem Valley.

A broad northwest trending mound of water forms a ground water divide in the basalt aquifer north and west of the town of Alexander (Dion, 1969, p. 19 and Figure 5, and Norton, 1981, Figure 5). Water north of the divide flows to the Snake River Basin, and water to the south flows to the Bear River Basin. The general ground water flow direction south of the divide is to the Bear River.

The primary source of recharge to the basalt aquifer is underflow from the aquifer in the Soda Springs hydrologic province. Other sources are precipitation on the valley floor and the mountains, percolation from irrigation, canal leakage, and stream losses (Norton, 1981, p. 11, and Dion, 1974, p.19). The alluvial aquifer in Gentile Valley is recharged by surface water along the valley margins and by precipitation on the alluvium. Ground water is discharged from both aquifers by the hundreds of springs and seeps along the Bear River, evapotranspiration, underflow to the Portneuf Valley, and wells (Norton, 1981, p. 11, and Dion, 1969, p. 19).

Spring Delineation Methods

Delineation of the wellhead protection area for a spring involves special consideration. Hydrogeologic setting is foremost among the factors that control the shape and extent of the capture zone. A spring resulting from the presence of a high permeability fracture extending to great depth will have a much different capture zone than a depression spring formed where the ground surface intersects the water table in an unconsolidated aquifer. The latter can be reasonably modeled as either a well or an internal constant head boundary.

In many cases, however, the methods commonly used to delineate protection areas for water supply wells are not applicable (Jensen et al., 1997). Application of the refined method using WhAEM (Kraemer et al., 2000), for instance, may not be appropriate for a fracture or tubular spring produced from an aquifer that displays a high degree of heterogeneity and anisotropy. Techniques that are most applicable to the springs within the scope of this report are the topographic, refined, and calculated fixed-radius methods. Hydrogeologic mapping techniques have been useful in characterizing the hydrogeologic setting and the zone of contribution to springs (Jensen et al., 1997, pp. 6-7). Other techniques such as tracer and isotope studies, potentiometric surface mapping, geochemical characterization, and geophysical survey interpretation require data that are not available without additional fieldwork.

Hydrogeologic mapping techniques include hydrogeologic mapping, fracture-trace analysis, topographic method, and geomorphic analysis. The hydrogeologic mapping method can be used to identify lithologic units that may provide water to springs, low-permeability units and/or faults that may form aquifer boundaries or preferential pathways, fracture orientation or karst features that can control ground water flow, and potential recharge areas. The information obtained from geologic maps can be sufficient to indicate the zone of contribution. The utility of this method is dependent on the accuracy and the degree to which the lithologic units of interest are exposed. Fracture-trace analysis can assist in identifying flow boundaries or preferential flow paths. The topographic method involves the use of topographic maps to locate boundaries of surface drainage basins around springs. Geomorphic analysis uses both geologic and topographic analysis and applies geomorphic principles to infer subsurface structures from landforms (Jensen et al., 1997, pp. 7-8).

Springs

The refined, topographic, and calculated fixed-radius methods were used to delineate capture zones for PWS springs in southeast Idaho. Springs located within hydrologic provinces and within previously simulated aquifers were delineated using the refined method. The refined method (using the uniform flow option in WhAEM) was also used for springs that generally lacked hydrologic data but had a reasonable basis for predicting ground-water flow direction and were located outside previously simulated flow domains. The refined method was used for the Thatcher Water Company spring.

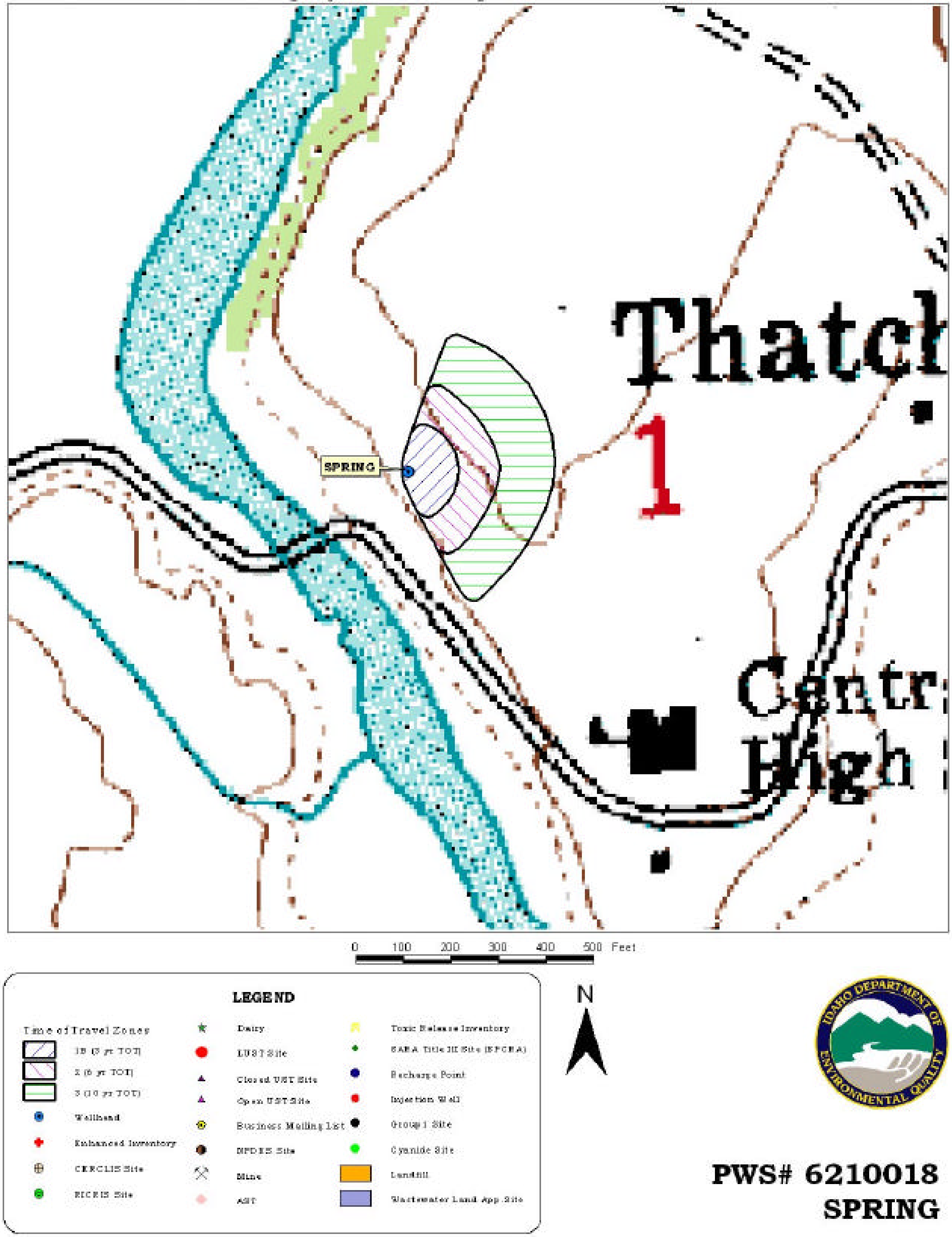
Refined Method

The uniform flow option of WhAEM was used to delineate the source areas for seven springs that had some basis for estimating the flow direction, were located within Cache and Gem/Gentile Valleys, and had a general lack of other hydrogeologic data. Required input for the uniform flow option includes hydraulic gradient, hydraulic conductivity, aquifer thickness, and flow direction, but it does not require the explicit definition of hydrologic boundaries. The creation of a uniform flow model as used in this delineation effort involved only two of the four main elements of the refined method. Model Calibration (element 2) and Sensitivity Analysis (element 3) were not performed because there were no water level data with which to calibrate the models.

For the uniform flow models it is assumed that the PWS springs issue from sedimentary rock, due to the prevalence of this material throughout the mountains of southern Idaho. For this reason, the hydraulic conductivity, effective porosity, and hydraulic gradient used in the models are the default values presented in Table F-3 of the Idaho Wellhead Protection Plan for mixed volcanic and sedimentary rocks, primarily sedimentary rocks (IDEQ, 1997, p. F-6). The average discharge rates reported by the owner/operator or the State of Idaho Public Water Supply Inventory Form were used for the Thatcher Water Company spring. A base elevation of 0 feet-mean sea level (msl) was used to simplify the modeling process and had no impact on the size or shape of the resulting source areas. To maintain conservatism, no areal recharge was applied in any of the uniform flow simulations.

The delineated source water assessment area for the Thatcher Water Company spring can best be described as a 2.74 acre eastward trending sector approximately 325 feet long and 600 feet wide (Figure 2). The actual data used by WGI in determining the source delineation area is available from DEQ upon request.

FIGURE 2. Thatcher Water Company Delineation Map and Potential Contaminant Source Locations



Identifying Potential Sources of Contamination

A potential source of contamination is defined as any facility or activity that stores, uses, or produces, as a product or by-product, the contaminants regulated under the Safe Drinking Water Act.

Furthermore, these sources have a sufficient likelihood of releasing such contaminants into the environment at levels that could pose a concern relative to drinking water sources. The goal of the inventory process is to locate and describe those facilities, land uses, and environmental conditions that are potential sources of ground water contamination. Field surveys conducted by DEQ and reviews of available databases identified potential contaminant sources within the delineation areas.

It is important to understand that a release may never occur from a potential source of contamination provided they are using best management practices. Many potential sources of contamination are regulated at the federal level, state level, or both, to reduce the risk of release. Therefore, when a business, facility, or property is identified as a potential contaminant source, this should not be interpreted to mean that this business, facility, or property is in violation of any local, state, or federal environmental law or regulation. What it does mean is that the potential for contamination exists due to the nature of the business, industry, or operation. There are a number of methods that water systems can use to work cooperatively with potential sources of contamination, including educational visits and inspections of stored materials. Many owners of such facilities may not even be aware that they are located near a public water supply well.

Contaminant Source Inventory Process

A two-phased contaminant inventory of the study area was conducted in May and October 2002. The first phase involved identifying and documenting potential contaminant sources within the Thatcher Water Company source water assessment area through the use of computer databases and Geographic Information System (GIS) maps developed by DEQ. The second, or enhanced, phase of the contaminant inventory involved contacting the operator to identify and add any additional potential sources in the delineated areas. The enhanced inventory was completed with the assistance of Neale Walton, President for the Thatcher Water Company. Neither the first phase nor the enhanced phase identified any potential contaminant sources within the spring's delineation.

Section 3. Susceptibility Analyses

The spring's susceptibility to contamination was ranked as high, moderate, or low risk according to the following considerations: construction, land use characteristics, and potentially significant contaminant sources. The susceptibility rankings are specific to a particular potential contaminant or category of contaminants. Therefore, a high susceptibility rating relative to one potential contaminant does not mean that the water system is at the same risk for all other potential contaminants. The relative ranking that is derived for the spring is a qualitative, screening-level step that, in many cases, uses generalized assumptions and best professional judgement. Attachment A contains the susceptibility analysis worksheet. The following summaries describe the rationale for the susceptibility ranking.

Spring Construction

Spring construction scores are determined by evaluating whether the spring has been constructed according to Idaho Code (IDAPA 58.01.08.04) and if the spring's water is exposed to any potential contaminants from the time it exits the bedrock to when it enters the distribution system. If the spring's intake structure, infiltration gallery, and housing are located and constructed in such a manner as to be permanent and protect it from all potential contaminants, is contained within a fenced area of at least 100 feet in diameter, and is protected from all surface water by diversions, berms, etc., then Idaho Code is being met and the score will be lower. If the spring's water comes in contact with the open atmosphere before it enters the distribution system, it receives a higher score. Likewise, if the spring's water is piped directly from the bedrock to the distribution system or is collected in a protected spring box without any contact to potential surface-related contaminants, the score is lower.

The spring was developed in 1973. Water is collected from more than one spring via a six-inch diameter pipe located two feet below the surface. The Southeast District Health Department Drinking Water Supply Report (2002) for the system noted that the spring is enclosed in a permanent structure and sealed to prevent entry of surface water. Surface water has been diverted around or away from the spring area. The spring overflow and drain are screened, and the area around the spring has restricted user access.

The spring rated moderate for system construction. According to the Water Supply Report (1997 and 2002), the water enters the distribution from the subsurface without coming into contact with the atmosphere. The score was increased because it is unknown if all the construction requirements were met, specifically if the area within 100 feet of the spring is fenced and in legal control of the Thatcher Water Company.

Potential Contaminant Source and Land Use

The spring rated moderate for IOCs (i.e., nitrates, arsenic), low for VOCs (i.e., petroleum products), SOCs (i.e., pesticides), and microbial contaminants (i.e., bacteria). No potential contaminant point sources exist within the delineation, however, the delineation exists within a nitrate priority area and the amount of agricultural land surrounding the spring contributed to the scores.

Final Susceptibility Ranking

A detection above a drinking water standard MCL, any detection of a VOC or SOC, or confirmed detection of total coliform bacteria or fecal coliform bacteria at the spring will automatically give a high susceptibility rating to the spring, despite the land use of the area, because a pathway for contamination already exists. In May 1997, bacteria was found at the spring source automatically rating it highly susceptible. Additionally, potential contaminant sources within 100 feet of a spring will automatically lead to a high susceptibility rating. System construction scores are heavily weighted in the final scores. Having multiple potential contaminant sources in the 0- to 3-year TOT zone (Zone 1B) contribute greatly to the overall ranking.

Table 1. Summary of Thatcher Water Company Susceptibility Evaluation

Susceptibility Scores[1]									
	Potential Contaminant Inventory				System Construction	Final Susceptibility Ranking			
	IOC	VOC	SOC	Microbials		IOC	VOC	SOC	Microbials
Spring	M	L	L	L	M	M	M	M	H*

[1]H = High Susceptibility, M = Moderate Susceptibility, L = Low Susceptibility,
IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical
***H = Auto rated as high due to bacteria detection in May 1997 at the spring**

Susceptibility Summary

No SOCs have been detected in the spring. The VOCs bromodichloromethane, chlorodibromomethane, and chloroform, disinfection byproducts related to chlorine, were detected in water originating from the spring in June and September 1996. The IOCs arsenic, barium, selenium, fluoride, and nitrate have been detected in tested water, but at levels below the MCL set by the EPA. RADs, gross alpha and gross beta, were also detected and were below the designated MCL. The spring exists in a nitrate priority area, and nitrate has been detected in concentrations as high as 8.31 mg/L, which is approaching the MCL of 10 mg/L. Repeat detections of total coliform have occurred in the distribution system between February 1993 and June 2000. In addition, *E.coli* bacteria have also been detected in the distribution system in June 1994 and June 2000. Total coliform has been detected once at the spring in May 1997.

In terms of total susceptibility, the spring rated moderate for IOCs, VOCs, SOCs, and automatically rated high for microbial contaminants due to the bacteria present at the spring in May 1997. System construction rated moderate, and potential contaminant and land use scores were moderate for IOCs, and low for VOCs, SOCs, and microbial contaminants (Table 1).

Section 4. Options for Drinking Water Protection

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources. If the system should need to expand in the future, new well or spring sites should be located in areas with as few potential sources of contamination as possible, and the site should be reserved and protected for this specific use.

An effective drinking water protection program is tailored to the particular local drinking water protection area. A community with a fully developed source water protection program will incorporate many strategies. For Thatcher Water Company, drinking water protection activities should first focus on correcting any deficiencies outlined in the sanitary survey. No potential contaminants (livestock, pesticides, paint, fuel, cleaning supplies, etc.) should be stored or applied within 100 feet of the spring. As land uses within most of the source water assessment areas are outside the direct jurisdiction of the Thatcher Water Company, making collaboration and partnerships with state and local agencies, and industrial and commercial groups is important to ensure future land uses are protective of ground water quality.

Should microbial contamination continue to be a problem, appropriate disinfection practices would need to be maintained in a way to protect the drinking water from VOC by-products, a result of the chlorinating disinfection. The disinfection products detected in the water were bromodichloromethane, chlorodibromomethane, and chloroform. Though water cannot be totally free of by-products when disinfection is used, they can be reduced by treatment modifications. More information can be researched on the EPA website (www.epa.gov/safewater/).

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. A strong public education program should be a primary focus of any drinking water protection plan as the delineation contains some urban and residential land uses. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the U.S. EPA. Drinking water protection activities within the delineation should be coordinated with the Idaho State Department of Agriculture, the Soil Conservation Commission, and the Franklin County Soil Water Conservation District.

A community must incorporate a variety of strategies in order to develop a comprehensive drinking water protection plan, be they regulatory in nature (i.e., zoning, permitting) or non-regulatory in nature (i.e., good housekeeping, public education, specific best management practices). For assistance in developing protection strategies please contact the Pocatello Regional Office of the DEQ or the Idaho Rural Water Association.

Assistance

Public water supplies and others may call the following DEQ offices with questions about this assessment and to request assistance with developing and implementing a local protection plan. In addition, draft protection plans may be submitted to the DEQ office for preliminary review and comments.

Pocatello Regional DEQ Office	(208) 236-6160
State DEQ Office	(208) 373-0502

Website: www.deq.state.id.us

Water suppliers serving fewer than 10,000 persons may contact Melinda Harper (mlharper@idahoruralwater.com), Idaho Rural Water Association, at (208) 343-7001 for assistance with drinking water protection (formerly wellhead protection) strategies.

POTENTIAL CONTAMINANT INVENTORY LIST OF ACRONYMS AND DEFINITIONS

AST (Aboveground Storage Tanks) – Sites with aboveground storage tanks.

Business Mailing List – This list contains potential contaminant sites identified through a yellow pages database search of standard industry codes (SIC).

CERCLA – This includes sites considered for listing under the **Comprehensive Environmental Response Compensation and Liability Act (CERCLA)**. CERCLA, more commonly known as Superfund is designed to clean up hazardous waste sites that are on the national priority list (NPL).

Cyanide Site – DEQ permitted and known historical sites/facilities using cyanide.

Dairy – Sites included in the primary contaminant source inventory represent those facilities regulated by Idaho State Department of Agriculture (ISDA) and may range from a few heads to several thousand head of milking cows.

Deep Injection Well – Injection wells regulated under the Idaho Department of Water Resources generally for the disposal of stormwater runoff or agricultural field drainage.

Enhanced Inventory – Enhanced inventory locations are potential contaminant source sites added by the water system. These can include new sites not captured during the primary contaminant inventory, or corrected locations for sites not properly located during the primary contaminant inventory. Enhanced inventory sites can also include miscellaneous sites added by the Idaho Department of Environmental Quality (DEQ) during the primary contaminant inventory.

Floodplain – This is a coverage of the 100year floodplains.

Group 1 Sites – These are sites that show elevated levels of contaminants and are not within the priority one areas.

Inorganic Priority Area – Priority one areas where greater than 25% of the wells/springs show constituents higher than primary standards or other health standards.

Landfill – Areas of open and closed municipal and non-municipal landfills.

LUST (Leaking Underground Storage Tank) – Potential contaminant source sites associated with leaking underground storage tanks as regulated under RCRA.

Mines and Quarries – Mines and quarries permitted through the Idaho Department of Lands.)

Nitrate Priority Area – Area where greater than 25% of wells/springs show nitrate values above 5mg/l.

NPDES (National Pollutant Discharge Elimination System) – Sites with NPDES permits. The Clean Water Act requires that any discharge of a pollutant to waters of the United States from a point source must be authorized by an NPDES permit.

Organic Priority Areas – These are any areas where greater than 25% of wells/springs show levels greater than 1% of the primary standard or other health standards.

Recharge Point – This includes active, proposed, and possible recharge sites on the Snake River Plain.

RCRA – Site regulated under **Resource Conservation Recovery Act (RCRA)**. RCRA is commonly associated with the cradle to grave management approach for generation, storage, and disposal of hazardous wastes.

SARA Tier II (Superfund Amendments and Reauthorization Act Tier II Facilities) – These sites store certain types and amounts of hazardous materials and must be identified under the Community Right to Know Act.

Toxic Release Inventory (TRI) – The toxic release inventory list was developed as part of the Emergency Planning and Community Right to Know (Community Right to Know) Act passed in 1986. The Community Right to Know Act requires the reporting of any release of a chemical found on the TRI list.

UST (Underground Storage Tank) – Potential contaminant source sites associated with underground storage tanks regulated as regulated under RCRA.

Wastewater Land Applications Sites – These are areas where the land application of municipal or industrial wastewater is permitted by DEQ.

Wellheads – These are drinking water well locations regulated under the Safe Drinking Water Act. They are not treated as potential contaminant sources.

NOTE: Many of the potential contaminant sources were located using a geocoding program where mailing addresses are used to locate a facility. Field verification of potential contaminant sources is an important element of an enhanced inventory.

References Cited

Alt, D. D., and D.W. Hyndman, 1989, Roadside Geology of Idaho, Mountain Press Publishing Company, Missoula, Montana, 394 p.

Bjorklund, L.J., and L.J. McGreevy, 1971, Ground-Water Resources of Cache Valley, Utah and Idaho, State of Utah Department of Natural Resources Technical Publication No. 36, 72 p.

Dion, N.P., 1969, Hydrologic Reconnaissance of the Bear River in Southeastern Idaho, U.S. Geological survey and Idaho Department of Reclamation, Water Information Bulletin No. 13, 66 p.

Dion, N.P., 1974, An Estimate of Leakage from Blackfoot Reservoir to Bear River Basin, Southeastern Idaho, U.S. Geological Survey and Idaho Department of Water Administration, Water Information Bulletin No. 34, 24 p.

Donato, M.M, 1998, Surface-Water/Ground-Water Relations in the Lemhi River Basin, East-Central Idaho, U.S. Geological Survey, Water-Resources Investigations Report 98-4185, 28 p.

Drinking Water Information Management System (DWIMS). Idaho Department of Environmental Quality.

Graham, W.G., and L.J. Campbell, 1981, Groundwater Resources of Idaho, Idaho Department of Water Resources, 100 p.

Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environment Managers, 1997. “Recommended Standards for Water Works.”

IDAPA 58.01.08, Idaho Rules for Public Drinking Water Systems, Section 004.

IDAPA 58.01.08.550.01. 2000. Design Standards for Public Drinking Water Systems.

Idaho Department of Environmental Quality. 2000. Source Water Assessment Program Public Water System Questionnaire.

Idaho Division of Environmental Quality Ground Water Program, October 1999. Idaho Source Water Assessment Plan.

Jensen, M.E., M. Lowe, and M. Wireman, 1997, Investigation of Hydrogeologic Mapping to Delineate Protection Zones around Springs, Report of Two Case Studies, National Risk Management Research Laboratory, U.S. Environmental Protection Agency,EPA/600/R-97/023, 60 p.

Kariya, K.A., D.M. Roark, and K.M. Hanson, 1994, Hydrology of Cache County, Utah, and Adjacent Parts of Idaho, with Emphasis on Simulation of Ground-Water Flow, State of Utah Department of Natural Resources Division of Water Resources Division of Water Rights, 120 p.

Kraemer, S.R., H.M. Haitjema, and V.A. Kelson, 2000, Working with WhAEM2000 Source Water Assessment for a Glacial Outwash Well Field, Vincennes, Indiana, U.S. Environmental Protection Agency, Office of Research, EPA/600/R-00/022, 50 p.

Neely, K.W., 2001, Statewide Monitoring Network, Microsoft Access, Idaho Department of Water Resources.

Norton, M.A., 1981, Investigation of the Ground Water Flow System in Gem Valley, Idaho Department of Water Resources, Boise, Idaho, 28 p.

Parliman, D.J., 1982, Ground-Water Quality in East-Central Idaho Valleys, U.S. Geological Survey, Open File Report 81-1011, 55 p.

Ralston, D.R., and E.W. Trihey, 1975, Distribution of Precipitation in Little Long Valley and Dry Valley Caribou County, Idaho, Idaho Bureau of Mines and Geology, Moscow, Idaho, 13 p.

Ralston, D.R., T.D. Brooks, M.R. Cannon, T.F. Corbet, Jr, H. Singh, G.V. Winter and C.M. Wai, 1979, Interaction of Mining and Water Resource Systems in the Idaho Phosphate Field, Research Technical Completion Report, Idaho Resources Research Institute, University of Idaho, 214 p.

Safe Drinking Water Information System (SDWIS). Idaho Department of Environmental Quality.

Southeast District Health Department Drinking Water Supply Report. 1997. Sanitary Survey for Thatcher Water Company: PWS #6210018.

Southeast District Health Department Drinking Water Supply Report. October 2002. Sanitary Survey for Thatcher Water Company: PWS #6210018.

Washington Group International, Inc, January 2002. Source Area Delineation Report for the Bear River Basin.

Attachment A

Thatcher Water Company

Susceptibility Analysis Worksheet

Susceptibility Analysis Formulas

Formula for Spring Sources
The final spring scores for the susceptibility analysis were determined using the following formulas:

1. VOC/SOC/IOC/ Final Score = (Potential Contaminant/Land Use X 0.818) + System Construction

2. Microbial Final Score = (Potential Contaminant/Land Use X 1.125) + System Construction

<u>Final Susceptibility Scoring:</u>

0 - 7 Low Susceptibility
8 - 15 Moderate Susceptibility
≥ 16 High Susceptibility

Spring Water Susceptibility Report   Public Water System Name : THATCHER WATER COMPANY   Well# : SPRING
Public Water System Number 6210018   09/13/2002 11:39:19 AM

1. System Construction

		SCORE
Intake structure properly constructed	NO	1
Is the water first collected from an underground source Yes=spring developed to collect water from beneath the ground; lower score No=water collected after it contacts the atmosphere or unknown; higher score	NO	0
Total System Construction Score		1

2. Potential Contaminant / Land Use - ZONE 1A

		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	IRRIGATED CROPLAND	2	2	2	2
Farm chemical use high	NO	0	0	0	
IOC, VOC, SOC, or Microbial sources in Zone 1A	YES	NO	NO	NO	YES
Total Potential Contaminant Source/Land Use Score - Zone 1A		2	2	2	2
Potential Contaminant / Land Use - ZONE 1B					
Contaminant sources present (Number of Sources)	NO	0	0	0	0
(Score = # Sources X 2) 8 Points Maximum		0	0	0	0
Sources of Class II or III leacheable contaminants or	YES	4	0	0	
4 Points Maximum		4	0	0	
Zone 1B contains or intercepts a Group 1 Area	YES	2	0	0	0
Land use Zone 1B	Greater Than 50% Irrigated Agricultural Land	4	4	4	4
Total Potential Contaminant Source / Land Use Score - Zone 1B		10	4	4	4
Potential Contaminant / Land Use - ZONE II					
Contaminant Sources Present	NO	0	0	0	
Sources of Class II or III leacheable contaminants or	YES	1	0	0	
Land Use Zone II	Greater Than 50% Irrigated Agricultural Land	2	2	2	
Potential Contaminant Source / Land Use Score - Zone II		3	2	2	0
Potential Contaminant / Land Use - ZONE III					
Contaminant Source Present	NO	0	0	0	
Sources of Class II or III leacheable contaminants or	YES	1	0	0	
Is there irrigated agricultural lands that occupy > 50% of	YES	1	1	1	
Total Potential Contaminant Source / Land Use Score - Zone III		2	1	1	0
Cumulative Potential Contaminant / Land Use Score		17	9	9	6

4. Final Susceptibility Source Score

	IOC	VOC	SOC	Microbial
4. Final Susceptibility Source Score	15	8	8	8
5. Final Well Ranking	Moderate	Moderate	Moderate	High*